5 Review

5.1 Expand Binomials, pages 234–241

1. Expand and simplify.

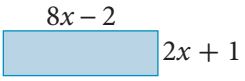
a) $(x + 5)(x + 8)$

b) $(2x + 9)(7x - 10)$

c) $(x + 13)^2$

d) $(x - 7)(x + 7)$

2. Write a simplified expression for the area of the rectangle.



5.2 Change Quadratic Relations From Vertex Form to Standard Form, pages 242–247

3. Write each relation in standard form.

a) $y = 5(x + 10)^2 + 7$

b) $y = -0.5(x + 8)^2 + 4$

c) $y = 9(x - 8)^2 - 4$

d) $y = 2(x + 1)^2 - 6$

4. Find the y-intercept for each relation in question 3.

5. A ball is kicked straight up. Its path is modelled by the relation $h = -4.9t^2 + v_0t + h_0$, where h is the ball's height in metres, h_0 is the ball's initial height, in metres, t is the time in seconds, and v_0 is the ball's initial velocity, in metres per second. The ball reaches a maximum height of 45 m after 3 s. Determine the ball's initial velocity and initial height.

5.3 Factor Trinomials of the Form $x^2 + bx + c$, pages 248–255

6. Factor.

a) $x^2 + 15x$

b) $x^2 + 13x + 40$

c) $x^2 + 10x + 25$

d) $x^2 - 81$

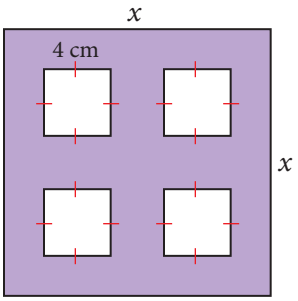
e) $x^2 + 2x - 24$

f) $x^2 - 12x + 35$

g) $x^2 - 100$

h) $x^2 - 11x - 12$

7. a) Write a factored expression for the area of the shaded region of this figure.



b) Calculate the area of the shaded region when $x = 30$ cm.

5.4 Factor Trinomials of the Form $ax^2 + bx + c$, pages 256–263

8. Factor fully.

a) $4x^2 + 72x + 308$

b) $12x^2 + 96x$

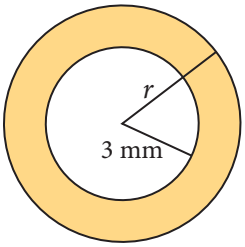
c) $3x^2 - 12x - 135$

d) $-2x^2 - 24x - 72$

e) $-8x^2 + 200$

f) $10x^2 - 80x - 200$

9. **a)** Write a factored expression for the area of the shaded region of this figure.



b) Suppose $r = 15$ mm. Find the area of the shaded region.

5.5 The *x*-Intercepts of a Quadratic Relation, pages 264–275

10. Find the zeros of each quadratic relation.

a) $y = x^2 - 16x$

b) $y = x^2 - 16$

c) $y = 6x^2 + 24x - 192$

11. Write each quadratic relation in standard form, then find the zeros.

a) $y = 3(x - 1)^2 - 147$

b) $y = -4(x + 6)^2 + 36$

12. The path of a soccer ball can be modelled by the relation $h = -0.1d^2 + 0.5d + 0.6$, where h is the ball's height and d is the horizontal distance from the kicker.

a) Find the zeros of the relation.

b) What do the zeros mean in this context?

5.6 Solve Problems Involving Quadratic Relations, pages 276–285

13. For each quadratic relation, find the zeros and the maximum or minimum.

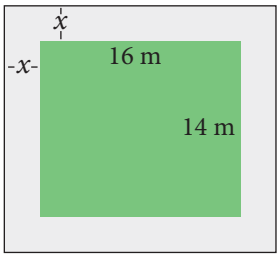
a) $y = x^2 + 16x + 39$

b) $y = 5x^2 - 50x - 120$

c) $y = -2x^2 - 28x + 64$

d) $y = 6x^2 + 36x - 42$

14. A garden is to be surrounded by a paved border of uniform width.



a) Write a simplified expression for the area of the border.

b) The border is to have an area of 216 m^2. Find the width of the border.

15. A rider on a mountain bike jumps off a ledge. Her path is modelled by the relation $h = -0.3d^2 + 1.2d + 1.5$, where h is her height above the ground and d is her horizontal distance from the ledge, both in metres.

a) What is the height of the ledge?

b) How far was the rider from the ledge when she landed?

5 Practice Test

For questions 1 to 6, choose the best answer.

1. Which expression is equivalent to $(2x + 9)(2x + 9)$?

A $4x^2 + 81$

B $4x^2 - 81$

C $4x^2 + 18x + 81$

D $4x^2 + 36x + 81$

2. Which expression is the result of expanding and simplifying $(5x - 7)(3x + 5)$?

A $15x^2 + 46x + 35$

B $15x^2 + 4x - 35$

C $8x^2 + 20x + 13$

D $8x^2 - 13$

3. Which relation represents the same parabola as $y = 5(x - 6)^2 - 20$?

A $y = 5x^2 - 6x - 20$

B $y = 5x^2 - 12x + 16$

C $y = 5x^2 - 60x + 160$

D $y = 5x^2 - 12x + 160$

4. Which expression is the factored form of $x^2 - 8x - 20$?

A $(x - 8)(x - 20)$

B $(x - 10)(x + 2)$

C $(x + 8)(x + 20)$

D $(x - 2)(x + 10)$

5. Which is the equation of the axis of symmetry for the quadratic relation $y = (x - 7)(x + 17)$?

A $x = -5$ **B** $x = 7$

C $x = 12$ **D** $x = 17$

6. Which are the zeros for the quadratic relation $y = 5x^2 - 1125$?

A $x = 0$

B $x = 5, x = 15$

C $x = -15, x = 5$

D $x = -15, x = 15$

7. Which expression is the factored form of $4x^2 - 44x - 240$?

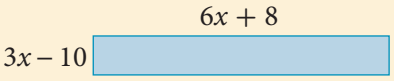
A $4(x - 44)(x - 240)$

B $4(x - 4)(x - 60)$

C $4(x - 15)(x + 4)$

D $4(x - 11)(x - 60)$

8. **a)** Write an expression, in simplified form, for the area of the rectangle.



b) Find the area of the rectangle when $x = 5$ cm.

9. Write each quadratic relation in standard form.

a) $y = 13(x + 7)^2 + 11$

b) $y = -4(x - 3)^2 + 16$

c) $y = 5.6(x - 1.2)^2 - 8.2$

10. Find the zeros of each quadratic relation.

a) $y = x^2 - 2x - 35$

b) $y = 3x^2 + 12x - 96$

c) $y = -2.5x^2 - 40x - 70$

Chapter Problem Wrap-Up

Throughout this chapter, you looked at many aspects of designing and building a fountain. Now, you will design your own fountain. Describe how you would use quadratic relations in the design. Besides the jets of water, what other aspects of the fountain must you consider?

11. The curve of a cable on a suspension bridge can be modelled by the relation $h = 0.0025(d - 100)^2 + 25$ where h is the cable's height above the ground and d is the horizontal distance from the tower, both in metres.

a) At what height does the cable meet the tower?

b) What is the least height of the cable above the ground?

12. A circus acrobat jumps off a raised platform. He lands on a trampoline at stage level below. His path can be modelled by the relation $h = -0.7d^2 + 0.7d + 4.2$, where h is his height above the stage and d is his horizontal distance from the edge of a platform, both in metres.

a) What is the height of the platform?

b) How far from the edge of the platform did the acrobat land?

c) What was the acrobat's maximum height above the stage?